

CLAIMS

1. A system for web inspection of a web, the system comprising:  
2        a plurality of smart cameras, each smart camera for detecting a plurality  
4        of web flaws from a streaming video signal, each smart camera  
4        having means for generating flaw image data and flaw location  
4        data;  
6        a host computer for controlling the low contrast web inspection system  
6        and for accepting and displaying the flaw image data and the flaw  
8        location data; and  
8        an ethernet for connecting the plurality of smart cameras to the host  
10      computer.

2. The system of claim 1, wherein each smart camera of the plurality of smart  
2        cameras comprises:  
4        a line scan camera for generating a pixel representation of a portion of  
4        the web;  
6        a lighting uniformity and pixel sensitivity correction means for correcting  
6        each pixel of the pixel representation and for providing a corrected  
6        pixel representation;  
8        a web edge detector for detecting at least one edge of the web;  
10      a multi-pipeline pre-processor for filtering the corrected pixel  
10      representation, the multi-pipeline preprocessor generating a  
10      prioritized data stream of potential flaws;  
12      a run length encoder for generating location data regarding a location of  
12      each group of the potential flaws in a cross direction;  
14      a blob detector for generating block data regarding the location of blocks  
14      of the potential flaws along a machine direction; and  
16      an inspect/reject analyzer for determining actual flaw data from the  
16      prioritized data stream of potential flaws.

*X8*  
3. The system of claim 2, wherein the multi-pipeline processor comprises:

- 2 a plurality of filters for averaging the corrected pixel representation over a distance of the web along a machine direction of the web;
- 4 a plurality of adaptive background subtraction channels connected to the plurality of filters;
- 6 a plurality of thresholder, each thresholder of the plurality of thresholders connected to an output of an adaptive background subtraction channel of the plurality of adaptive background subtraction channels, each thresholder for grouping a subtracted pixel representations; and
- 10 a priority logic circuit for prioritizing the outputs of each of the plurality of thresholders.

4. The system of claim 3, wherein the plurality of filters comprises:

- 2 a background filter;
- 4 a machine direction streak filter;
- 4 a cross direction streak filter; and
- 6 a small flaw filter.

5. The system of claim 3, wherein the plurality of thresholders comprises:

- 2 a single pixel flaw detector;
- 4 a uniformity detector;
- 4 a machine direction streak detector;
- 6 a cross direction streak detector; and
- 6 a small flaw detector.

6. The system of claim 1, wherein each smart camera of the plurality of smart  
2 cameras detects the plurality of web flaws from the streaming video signal at a  
X<sup>2</sup> contrast approaching a signal noise level.

7. A method for low contrast web inspection of a web, the method comprising  
2 the steps of:  
4 providing at least one smart camera for inspecting at least a portion of the  
web;  
6 generating flaw image data and flaw location data;  
8 transmitting the flaw image data and flaw location data over an ethernet;  
10 displaying the flaw image data and flaw location data.

12 8. The method of claim 7, wherein the step of generating flaw image data and  
14 flaw location data comprises the steps of:  
16 generating a pixel representation of a portion of the web;  
18 correcting the pixel representation for a lighting uniformity and a pixel  
sensitivity;  
20 filtering the corrected pixel representation utilizing a plurality of filters;  
22 grouping the filtered corrected pixel representations to generate a  
24 plurality of potential flaw data streams;  
26 generating a prioritized data stream from the plurality of potential flaw  
28 data streams;  
30 generating cross direction location data regarding a location of the  
prioritized data stream;  
32 generating block data regarding the location of blocks of the prioritized  
34 data stream along a machine direction; and  
36 determining actual flaw data from the prioritized data stream of potential  
38 flaws utilizing the cross direction location data and the block data.

18 9. A method for generating a prioritized image data stream from a digitized  
2 video stream of a web, the method comprising the steps:  
4 averaging the digitized video stream over a distance of the web to  
6 generate an averaged background signal;  
8 averaging the digitized video stream over a distance of the web along a  
10 machine direction of the web to generate a filtered machine  
12 direction signal ;  
14 averaging the digitized video stream over a distance of the web along a  
16 cross direction of the web to generate a filtered cross direction  
18 signal;  
substituting the averaged background signal from the filtered machine  
direction signal to generate a first pixel representation;  
substituting the averaged background signal from the filtered cross  
direction signal to generate a second pixel representation;  
grouping the first and second pixel representations to generate at least  
two data streams of potential flaws; and  
prioritizing the at least two data streams of potential flaws to generate the  
prioritized image data stream.

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